



CASS COUNTY EMERGENCY SERVICES BOARD

CENTRALIZED COMMUNICATIONS CENTER FEASIBILITY STUDY

FINAL REPORT

May 31, 2018

Conducted by:

IXP Corporation

Princeton Forrestal Village
103 Main Street
Princeton, NJ 08540
609.759.5100 *phone*
609.759-5099 *fax*



TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
SECTION 1 – ORGANIZATIONAL CONCEPTS AND GOVERNANCE	2
CURRENT ENVIRONMENT	2
BUDGET OVERVIEWS	5
CONSOLIDATION CONCEPTS.....	6
GOVERNANCE CONCEPTS.....	7
SECTION 2 – OPERATIONAL CONSIDERATIONS.....	9
CURRENT STAFFING PRACTICES	9
CURRENT COMPENSATION PRACTICES	10
CURRENT TRAINING AND QA PRACTICES.....	11
NON-DISPATCH TASKS.....	11
TELEPHONE CALL VOLUMES AND CALL PROCESSING STATISTICS	14
PROJECTED CALL VOLUMES AND WORKLOAD FOR A FULLY CONSOLIDATED OPERATION.....	20
SECTION 3 – TECHNOLOGY CONSIDERATIONS.....	27
SECTION 4 – FACILITY OPTIONS.....	29
SECTION 5 – SUMMARY AND CLOSING.....	33

EXECUTIVE SUMMARY

Cass County encompasses an area of 697 square miles with a diverse mix of suburban and rural areas with public safety services provided by a large number of individual law enforcement and fire protection agencies. The 9-1-1 and emergency telephone call receiving and public safety dispatching for these agencies is provided by a combination of 5 communications centers operated by the cities of Belton, Raymore, Pleasant Hill and Harrisonville and the Sheriff's Office. This report has been developed for the Cass County Emergency Services Board (CCESB) to explore the feasibility of establishing a centralized communications center to serve all the public safety agencies in the county.

During this study, IXP examined the governance, operations, technology and facility characteristics of each of the communications centers as well as gathering information about the current costs for salaries, benefits and operational costs for each of the centers. Based on the information provided by each of the agencies, a total of \$2,714,338 is currently being expended for salaries and benefits, with each agency identifying a mix of incidental direct or indirect costs related to their communications operations. While each of the individual facilities are capable of meeting the needs of their individual agencies, none of the existing facilities can be sufficiently expanded to convert them into a single location to serve as a centralized communications center.

This report identifies two paths to achieving further centralization of 9-1-1 and dispatching services for Cass County, referred to as virtual consolidation and full physical consolidation.

- In the virtual consolidation approach, the current practice of operating on shared technology systems would be expanded to include modified strategies for 9-1-1 call routing and call-overflow handling coupled with either CAD system integration or migration to a single unified CAD system. Given the successful history in the region for governing and operating on the shared trunked radio system, 9-1-1 systems and services integrated within the overall MARC service delivery model, and all communications centers already utilizing CAD systems from the same vendor, the virtualization strategy is deemed to be highly viable. This approach would improve the speed and efficiency of processing 9-1-1 calls while also increasing the overall resiliency of 9-1-1 call receiving and dispatching services.
- In the full physical consolidation approach, a new facility would need to be developed to house a newly created public safety communications agency. This agency would be established with a fresh governance and operations model and be located in a facility sized to accommodate growth in the region and the resulting growth in the size of the 9-1-1 call receiving and dispatching operation. It would also require a competent backup facility to protect countywide services from any catastrophic event rendering the single consolidated facility inoperable.

Each of these strategies is discussed in detail in the report to allow decision-makers to consider the benefits, risks and costs of each approach. The virtualization strategy appears to be an extremely promising opportunity for the communications centers in Cass County to pursue further. Even if 9-1-1 services and configurations remain as they are today, migration to a single unified CAD system environment will significantly improve the speed, efficiency and resiliency of public safety communications capabilities for all of Cass County.

SECTION 1 – ORGANIZATIONAL CONCEPTS AND GOVERNANCE

CURRENT ENVIRONMENT

Cass County encompasses an area of 697 square miles with a diverse mix of suburban and rural areas with 23 municipalities. Some of the municipalities operate their own police departments, while others receive law enforcement services from the Cass County Sheriff's Office. Some of the municipalities are predominately located in other counties, with only a small footprint in Cass County while others are fully located in Cass County.

9-1-1 call receiving and dispatching for the jurisdictions with the majority of their area in Cass County is provided by a total of 5 communications centers in Cass County. These centers are operated by the police departments of Belton, Raymore, Pleasant Hill, Harrisonville and by the Sheriff's Office. The Table 1 below provides an overview of which agency provides law enforcement services for a particular municipality and which communications center provides primary 9-1-1 call answering and dispatching.

City	Law Enforcement Agency	Primary PSAP	Dispatched By
Archie	Archie PD	Sheriff's Office	Sheriff's Office
Baldwin Park	Sheriff's Office	Sheriff's Office	Sheriff's Office
Belton	Belton PD	Belton PD	Belton PD
Cleveland	Cleveland PD	Sheriff's Office	Sheriff's Office
Creighton	Creighton PD	Sheriff's Office	Sheriff's Office
Drexel	Drexel PD	Sheriff's Office	Sheriff's Office
East Lynne	East Lynne PD	Sheriff's Office	Sheriff's Office
Freeman	Freeman PD	Sheriff's Office	Sheriff's Office
Garden City	Garden City PD	Sheriff's Office	Sheriff's Office
Greenwood	Greenwood PD	Jackson County SO	Jackson County SO
Gunn City	Sheriff's Office	Sheriff's Office	Sheriff's Office
Harrisonville	Harrisonville PD	Harrisonville PD	Harrisonville PD
Kansas City	Kansas City PD	Kansas City PD	Kansas City PD
Lake Annette	Lake Annette Marshal	Sheriff's Office	Sheriff's Office
Lake Winnebago	Lake Winnebago PD	Sheriff's Office	Sheriff's Office
Lee's Summit	Lee's Summit PD	Lee's Summit PD	Lee's Summit PD
Loch Lloyd	Sheriff's Office	Sheriff's Office	Sheriff's Office
Peculiar	Peculiar PD	Raymore PD	Raymore PD
Pleasant Hill	Pleasant Hill PD	Pleasant Hill PD	Pleasant Hill PD
Raymore	Raymore PD	Raymore PD	Raymore PD
Riverview Estates	Sheriff's Office	Sheriff's Office	Sheriff's Office
Strassburg	Strassburg PD	Sheriff's Office	Sheriff's Office
Westline	Sheriff's Office	Sheriff's Office	Sheriff's Office

Table 1 - Law Enforcement 9-1-1 and Dispatching Relationships

The map below (Figure 1) provides a general overview of the jurisdictional areas of each municipality.

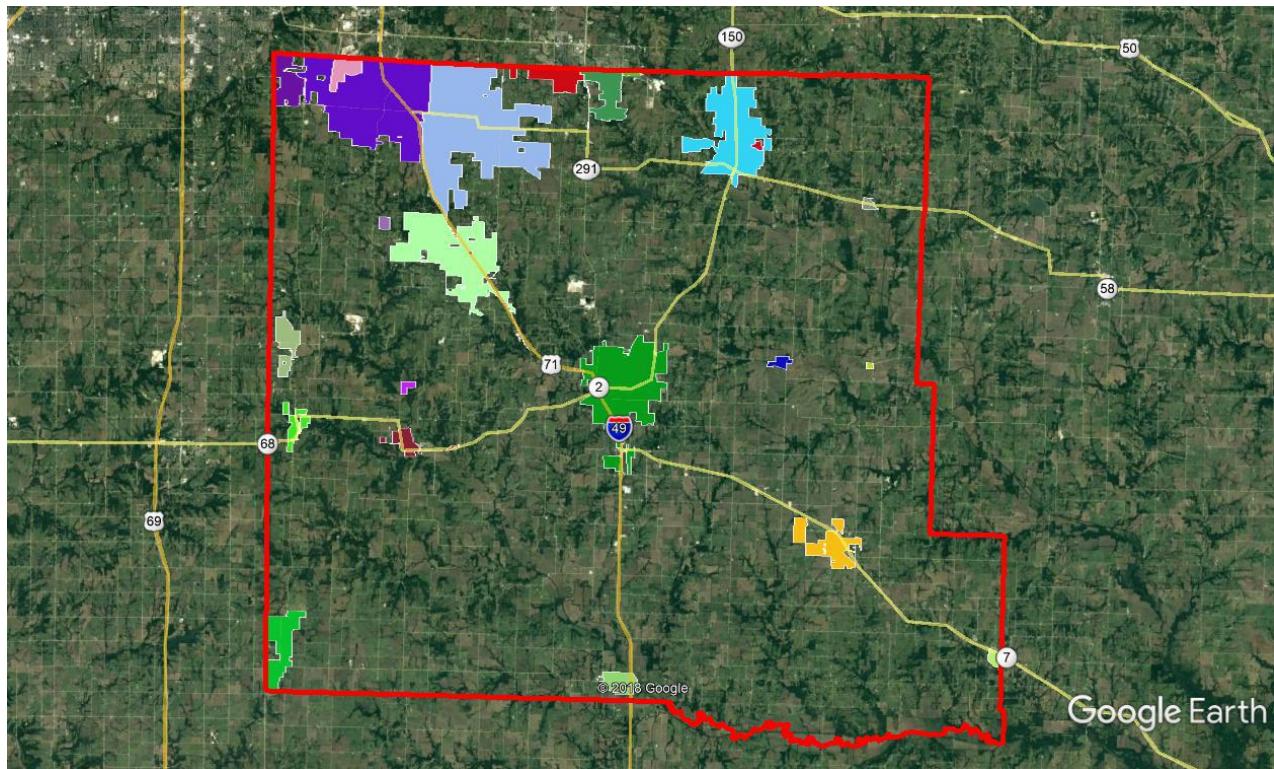


Figure 1 - Municipal Jurisdictions in Cass County

There are a total of 15 fire departments and fire protection districts with some or all of their service area in Cass County, some serving single municipal areas and others serving larger geographic areas that encompass one or more municipality. Since the geographic areas of these agencies don't specifically align with individual municipalities, there are a variety of 9-1-1 call answering and dispatching relationships. This includes 3 of the fire protection districts currently contracting for their dispatching services from the Lee's Summit Fire Department.

Table 2 on the following page provides an overview of the 9-1-1 answering and dispatching relationships for each of the fire agencies. Since fire agency service areas don't always align with the service areas handled for law enforcement services, there is a more complex mix of 9-1-1 call receiving and dispatching in the fire/EMS services, with 9-1-1 calls being initially answered in one communications center (routed to them based on the law enforcement service area) but then transferred to a different communications center for fire/EMS dispatching. The map that follows (Figure 2) provides an overview of the service areas of the fire/EMS agencies.

Fire Agencies	Primary PSAP	Dispatched By
Belton Fire Department	Belton PD	Belton PD
Central Cass FPD	Sheriff's Office	Sheriff's Office
Creighton FPD	Sheriff's Office	Sheriff's Office
Drexel FPA	Sheriff's Office	Sheriff's Office
Dolan West Dolan FPD	Sheriff's Office	Sheriff's Office
East Lynne Gunn City FPD	Sheriff's Office	Sheriff's Office
Garden City FPD	Sheriff's Office	Sheriff's Office
Harrisonville Fire Department	Harrisonville PD	Harrisonville PD
Kansas City Fire Department	Kansas City FD	Kansas City FD
Lee's Summit Fire Department	Lee's Summit FD	Lee's Summit FD
Mt. Pleasant FPD	Sheriff's Office	Belton PD
Pleasant Hill FPD	Pleasant Hill PD	Lee's Summit FD
South Metro FPD	Raymore PD	Raymore PD
West Peculiar FPD	Raymore PD or Sheriff	Lee's Summit FD
Western Cass FPD	Sheriff's Office	Lee's Summit FD

Table 2 - Fire/EMS 9-1-1 and Dispatching Relationships

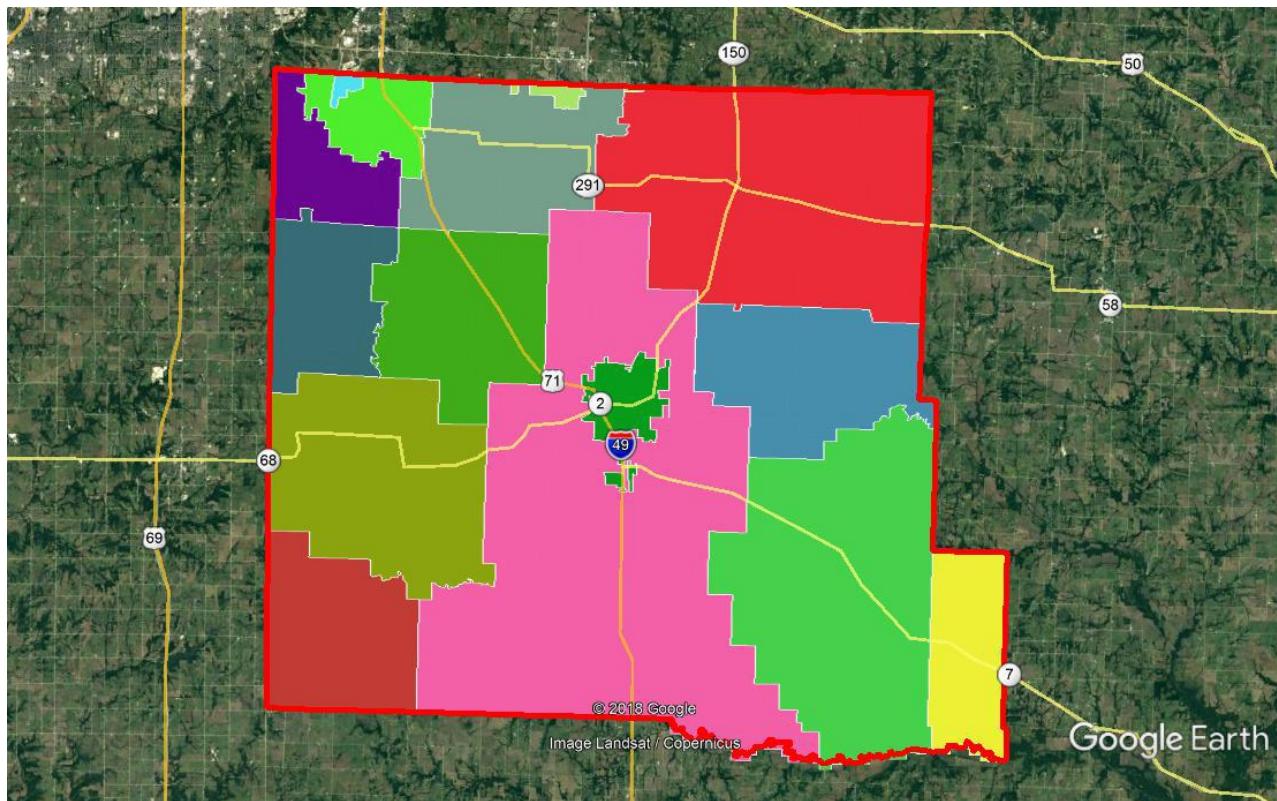


Figure 2 - Fire Departments and Districts

The 5 communications centers evaluated in this study (Belton PD, Raymore PD, Pleasant Hill PD, Harrisonville PD and the Cass County Sheriff's Office) are each organized as operational units within their individual agencies. As such, their governance and organization structure is directly linked to the governance and structure of their agency. Management and operational polices are individually established and controlled by each of these agencies, and consultative processes are used to shape operational guidelines for any outside agencies being served.

BUDGET OVERVIEWS

Budgeting strategies for the five communications centers vary in the degree to which costs are tracked in separate sub-org budgets or embedded in either other orgs within the municipality or within the overall agency budget. To the best of their ability, each operation provided salary, benefit and other costs for the operation of their communications center. Since many of the significant technology-related costs are paid for by the Cass County Emergency Services Board (CCESB) such as 9-1-1, radio system and CAD system costs, the vast majority of communications center costs are related to salaries and benefits for the operational personnel. These costs are shown in Table 3 below.

Communications Center	Salary & Benefit Costs
Belton PD	\$ 734,223
Raymore PD	\$ 712,846
Pleasant Hill PD	\$ 233,027
Harrisonville PD	\$ 330,361
Sheriff's Office	\$ 703,882
Total Salary & Benefit Costs	\$ 2,714,338

Table 3 - Salary & Benefit Costs

The ability to break out other operational costs for these communications centers vary across the agencies depending on how their internal budgeting is organized. For example, the Sheriff's Office budgets for their communications center as a stand-alone unit, Harrisonville includes the communications center and department administration together, and Belton budgets only at the agency level. Further, none of the jurisdictions have internal cost accounting systems in place to routinely allocate municipal administrative overhead costs such as city administration, accounting, human resources, etc. to the individual agencies, let alone to sub-org units such as the communications center.

Each agency was asked to identify any direct costs attributable to the communications center beyond their salary and benefit exposure. Belton PD was unable to provide a figure, Raymore identified \$13,250 in costs; Pleasant Hill identified \$2,800 in costs, Harrisonville identified \$74,472 in costs; and the Sheriff's Office identified \$18,900 in costs.

Collectively these costs amount to a small percentage of the overall operating costs of the communications centers since the other significant technology-oriented costs are paid for by the CCESB, and in some cases, would be costs that would not be shed if a centralization of dispatching services were consolidated into a single agency. Therefore, for purposes of this study, only the salary and benefit costs will be used to compare current operations to potential consolidation models.

CONSOLIDATION CONCEPTS

The Missouri 911 Service Board recently issued the Missouri 911 Modernization and Improvement Report¹ which identified a variety of consolidation strategies for consideration across the state. These included:

- Full Physical Consolidation where two or more existing communications centers physically and operationally consolidate to operate as a single multi-jurisdictional agency.
- Partial Physical Consolidation where some combination of physical co-location and/or operational consolidation are accomplished. This allows many of the fixed costs of individual facilities and systems to be spread across a larger number of participating entities.
- Shared Technology or Virtual Consolidation where shared systems and/or services are used to spread technology or services costs across a larger number of participating agencies while separate facilities and operations are kept in place. This is largely what Cass County is already accomplishing to some extent with the common 9-1-1 telephone systems and radio systems already in operation across the county.

From IXP's experience, all three of the above models can result in a combination of service level improvements and a reduction in annual operating costs for the participating agencies. However, when viewed from a total-cost perspective, jurisdictions that undertake physical consolidation strategies that require either substantial re-development of an existing communications center facility or the construction of a new communications center facility, often find that it takes many years of annual operational cost savings to recover the costs of building and equipping a facility capable of supporting the consolidated or even co-located operations.

In many cases the decision to pursue a full physical consolidation is also influenced by other external factors such as failing facilities or systems that already require significant upgrades/replacements or economic pressures requiring one or more communications centers in a region to shut-down or curtail operations due to the high costs of staffing smaller independent centers.

Since the communications centers are already operating on a common 9-1-1 telephone system platform and service provider, and since they are also operating on a common radio system platform and other technology systems such as logging recording, fire station alerting and community notification systems, (all of which are funded almost entirely by the CCESB) it is highly reasonable to consider pursuit of a virtual consolidation strategy that integrates the functionality of the CAD systems of the 5 separate communications centers (currently all from the same vendor but not linked together). Depending on how this was organized and operated it could allow workload sharing concepts to be developed to improve the overall capacity and resiliency of dispatch operations across the county. Therefore, the required changes to technology systems and operational models will be discussed in this report.

Full physical consolidation and centralization of communications center functions into a single facility will not be possible with any of the existing facilities currently in operation in the county. As discussed in the facilities section of this report, while several of these facilities are highly competent and capable of supporting reliable emergency communications services even in adverse storm conditions, none of them is large enough to serve as a single centralized dispatch facility for the entire county. Further, none of them is situated within their overall facility in such

¹ The report is available at the following link:

https://dps.mo.gov/dir/programs/ohs/documents/911_Advisory_Committee/modernization-improvement-report.pdf

a way that physical expansion to become a single centralized facility would be feasible. Therefore, in addition to the virtual consolidation model, the required facility, technology and related investments that would be needed to establish a single centralized facility will also be explored in this report.

GOVERNANCE CONCEPTS

Pursuit of a virtual consolidation strategy where existing communications centers remain in operation but additional CAD interoperability is established will require some adjustment in how operational policies and practices are organized. In the current environment, each agency makes their own independent decisions about how they configure their CAD systems to support their operations.

If a mechanism is found to provide CAD-to-CAD links for CAD interoperability, many of these choices will likely be able to remain in place and the only 'shared governance' issues will be in establishing the functional and technical details of the CAD interfaces and the operational practices used when incidents are entered in one CAD system but queued up for dispatch on an interconnected CAD system. Based on IXP's experience with other agencies that have implemented CAD-to-CAD interfaces, this level of governance can be provided by an inter-agency agreement that identifies the mutually agreed upon configuration and operational practices and establishes a routine process for maintaining these practices and the system interfaces over time. Typically, each agency in such a relationship identifies one individual to serve as their liaison to the governance process.

Since the current CAD systems exist in both stand-alone and hosted-service technology environments, CAD-to-CAD interfaces may not be the best model going forward. Instead, it may be best to establish a 'new' CAD system (from the same common vendor) and transition all the communications centers to operate off this single shared CAD system (such as is being done today with the radio system). Not only would this approach allow the avoidance of individual CAD licensing costs, it would create an operational environment that is more robust in its ability to share workload dynamically across all the communications centers.

Migration to a shared CAD system would also require a more robust governance process for the CAD environment. Since CAD systems are deeply integrated into agency operations, governing such a shared system should be approached more from the operational perspective than the technical perspective. Each of the participating communications centers would need to assign one or more personnel to serve as their liaison to the CAD governance process and that person (or those people) would need to bring a depth of operational and technical expertise and decision-making authority to allow them to mutually establish CAD configuration and operations practices to meet the collective needs of all the agencies being served.

Governance of a virtual consolidation environment also requires a formal mechanism for the agencies being served by the shared CAD system to have a mechanism to express their operational needs and interests. This can be accomplished in a variety of ways, such as each of them having a direct method of interfacing with the communications center providing their dispatch services or establishment of a regional 'user group' type organization that meets periodically and provides input to the collective group of communications centers that are formally linked into the virtually consolidated CAD operation.

If a full physical consolidation is pursued, a new governance structure is recommended to guide a newly-created organization. From IXP's experience, successful governance structures for these multi-jurisdictional and multi-discipline communications centers require three levels of governance control and oversight.

Governing Board – At the top level of the organization, some form or administrative governing body needs to be established to exercise the formal control and oversight of the organization. These bodies often are composed of either senior appointed officials such as city or county managers from the participating jurisdictions or elected leaders such as mayors or board chairs. It is important to balance the size of these bodies so they can work effectively and keep their focus on large-scale policy issues such as establishing formal performance expectations for the organization and reviewing/approving budgets and cost allocation models for the organization. In the early phases of establishing a new consolidated communications center it is not uncommon for this top-level body to meet as often as monthly, but as the organization matures these bodies typically reduce their meeting frequency to quarterly or 6-month cycles.

In situations where there are a large number of participating jurisdictions, such as would be the case in Cass County, it is recommended that the governing board be kept to a manageable size of something like seven members. IXP's experience is that trying to seat one representative from each participating agency would create a board that would be too large to function efficiently. Based on models observed in other similar circumstances, one possible approach would be to have three of the positions selected from within the participating municipal jurisdictions, three of the positions selected from within the participating fire protection districts, and one of the positions representing the county.

Operations Board – Below the top level governing board, an operations board should be established to provide more direct oversight and input on operational policies and procedures of the communications organization. Typically, these operations boards are composed on one representative (usually the Chief) from each of the law enforcement and fire agencies being served by the communications center. While this creates a large board, much of the work of this board is often accomplished in discipline specific workgroups with the law enforcement representatives focusing on their issues and fire representatives focusing on their issues. It is common to see these discipline-specific workgroups meet on routine basis, such as monthly, to provide input and guidance to the Director of the communications center. The full operations board may also meet monthly during the early phases of the new organization, and then reduce their meeting cycles to quarterly if the law enforcement and fire working groups are effectively meeting the routine guidance needs for the organization.

Technology Coordination Committee – Finally, it is important to create some form of technology coordination process between the communications center and the participating jurisdictions. A group of this nature would have a purely advisory role to the Director, the Operations Board and the Governing Board and work on an as-needed basis to coordinate technology interfaces, upgrades and enhancements of systems that interface the communications center to the individual agencies such as links between the communications center's CAD system and the individual records management systems at each of the agencies.

SECTION 2 – OPERATIONAL CONSIDERATIONS

CURRENT STAFFING PRACTICES

The agencies within Cass County staff each communications center following individual agency guidelines and needs. The agencies staff with a mix of full time and part time personnel. A few agencies utilize part time personnel who also work part time at another agency within the county. The supervision staff is a mix of sworn and civilian depending on the agency. Raymore and Belton both have dedicated civilian supervisors whose main duties do not include the dispatch functions. The agencies all have long time employees, as well as newly hired employees.

As can be seen by the breakdown below, all agencies are staffing their centers with a minimum of two communications personnel on duty for most of a 24-hour period. There are some instances where staffing does go down to one person during the night shift. The preferred staffing is three in the larger agencies, but vacancies do not always allow for the preferred staffing.

- Belton is the only agency utilizing 8-hour shifts. Staffing is 2 operators on duty all shifts. All staff are dedicated Communications personnel with a full time non-dispatch supervisor.
- Raymore staffs 12-hour shifts, with two operators on duty at all times, except during the deep night time hours when one operator is on duty.
- Pleasant Hill staffs 12-hour shifts with two operators on duty during the day, and one at night. The agency also uses Patrol Officers and a technical operations employee to cover a portion of dispatch operations.
- Harrisonville staffs 12-hour shifts, with minimum staffing of two.
- Cass County Sheriff's Office (CCSO) staffs 12-hour shifts, with minimum staffing of two, with three on duty during many hours and a minimum of three on duty by later in 2018.

If a full physical consolidation were pursued, consideration would need to be given to the shift schedule patterns to adopt for the new organization. Even though there may be a strong preference among the employee pool to continue 12-hour shift patterns since they are the most prevalent pattern today, it will also likely be important to consider a mix of 8, 10 and 12-hour shifts in the overall staffing model to allow staffing levels to rise and fall as call volumes vary through a normal 24-hour cycle.

CURRENT COMPENSATION PRACTICES

Compensation practices vary considerably across the existing communications centers. Raymore is currently offering the highest compensation levels for both Dispatchers and Supervisors and the Sheriff's Office is currently offering the lowest compensation levels for these positions. The other jurisdictions are spread between these two and shown in Table 4 below. Note that Pleasant Hill and Harrisonville don't have Supervisor positions in their current staffing models.

Annual Dispatcher Compensation Levels	Minimum	Maximum
Belton	\$ 32,422	\$ 49,334
Raymore	\$ 38,176	\$ 56,675
Pleasant Hill	\$ 37,232	\$ 50,502
Harrisonville	\$ 34,702	\$ 52,054
Sheriff's Office	\$ 32,028	\$ 43,833

Annual Supervisor Compensation Levels	Minimum	Maximum
Belton	\$ 41,503	\$ 63,152
Raymore	\$ 45,261	\$ 68,869
Pleasant Hill	NA	NA
Harrisonville	NA	NA
Sheriff's Office	\$ 40,627	\$ 55,601

Table 4 - Dispatcher and Supervisor Compensation Levels

Because the agencies hire from the same employee pool, (largely residents of Cass County and surrounding areas), the compensation packages for each agency probably have some impact on the recruiting capabilities of individual agencies. However, based on IXP's experience and anecdotal comments during our site visits, there are a number of other factors that influence where individual Dispatchers and Supervisors desire to work. These include associations with other employees of the jurisdiction, proximity to home and commute flexibilities, work schedules, work environment, and various other factors.

If a full physical consolidation were pursued, careful consideration would need to be given to the compensation levels for the new organization. If the compensation levels are set too low it increases the potential for personnel from existing agencies that are higher paid to not be interested in coming to work for the new organization. Conversely, automatically setting compensation levels at the current highest compensation among the participating organizations may unrealistically increase initial operating costs for the newly-formed organization.

From IXP's experience newly created consolidated centers establish their compensation levels so that they are competitive on a regional basis and often slightly higher than the surrounding averages. Special arrangements such as one-time incentive payments are also sometimes made to bring in existing personnel from agencies being consolidated that are currently at higher actual compensation levels than where they would be placed in the new organization. Since existing personnel are often spread across the compensation range rather than clustered at the top of the range, it is often possible to find a way to accommodate existing employees into the new compensation structure without having them experience any significant reduction in compensation.

CURRENT TRAINING AND QA PRACTICES

All the communications centers in Cass County follow similar protocols for training new hire employees. New-hire employees are sent to a 40-hour basic Telecommunicator class and a 24-hour Missouri Uniform Law Enforcement System (MULES) training. They are also given one to two weeks of local orientation to become familiar with the agency's personnel practices and the individual law enforcement and/or fire/EMS agencies being served by the center. In house on-the-job training (OJT) is then utilized to train personnel on specific operational practices, typically commencing with call receiving responsibilities and then expanding into dispatch responsibilities.

The length of time in training varies with the agency and depends on the skill of the individual trainee. The OJT does include the new hire sitting with an experienced dispatcher until they learn all positions. The communications centers all utilize some form of daily and weekly evaluation forms to track the performance of the trainees' progress during training. Each also has some combination of formal manuals and formalized training materials utilized for the training process. Each agency also performs some form of quality assurance process on the work performed by their personnel, particularly regarding any Emergency Medical Dispatch (EMD) protocol work they perform.

If a full physical consolidation were pursued, establishment of a well-structured training program will be essential. Even though much of the workforce will be coming already-trained from the existing operations, they will all need training in the operational practices and processes of the new multi-agency organization. It is not uncommon for consolidated communications centers to establish a formal position in the organization for a training coordinator to support this level of training discipline. For agencies the size of Cass County, this position would also be able to administer a formal quality assurance process in conjunction with the Shift Supervisors.

NON-DISPATCH TASKS

Warnings and Notifications – Each of the five communications centers are responsible for pushing out community warnings and notifications over the shared Everbridge notification system (with the cost of the system borne by the CCESB). The four municipal communications centers (Belton, Raymore, Pleasant Hill and Harrisonville) also have their communications centers equipped to allow them to activate their warning siren systems. The Sheriff's Office communications center does not have siren responsibilities since these sirens are not located in unincorporated Cass County. Both of these functions are easy to integrate into a physically consolidated operation if that course of action is chosen.

Walk-in Complaints – All the communications centers handle walk-in complaints in a similar manner. During office hours, the front lobby duties are handled by either the Records staff of the agency, or the front office staff. Each of the agencies do handle walk in complaints after hours and will dispatch officers/deputies if the walk in requires face to face contact. Walk in complaints utilize a phone connection between the lobby and the dispatch center for communications. In a few instances, citizens can be let into a "safe area" if necessary. Since current practices don't require the dispatchers to physically leave the communications room, the same approach can be utilized if a full physical consolidation is pursued. IXP has seen this practice implemented successfully many times, and occasionally augmented with a video linking kiosk at the police department lobby so the call receiver is able to better assess the demeanor and condition of the person reporting the incident.

Jail Duties – Only the Sheriff's Office and Belton have formal jails, and both are staffed with jail personnel so there are limited impacts on the communications center personnel. Communications personnel at the Sheriff's Office have few jail responsibilities beyond monitoring the Jail radio channel and handling interactions with jail personnel as needed. Since all warrant processing is handled in the communications center, a pneumatic tube is used to transfer warrant (and related) paperwork between the communications center and the jail. If a full physical consolidation were pursued, establishing mechanisms for handling warrant processes would be one of the more complex issues for the Sheriff's Office.

Belton's communications center is centrally located within the jail area of the facility and is more tightly integrated into jail operations. Belton also provides jail services for other communities including Raymore, Harrisonville, Greenwood, Archie, Garden City, Cleveland and the US Marshall's Service. Communications personnel are responsible for things like opening various electronically controlled doors, monitoring video feeds from various cameras, and performing matron duties if female officers aren't available for booking processes with female inmates. If a full physical consolidation were pursued, Belton would need to modify their jail staffing to support these functions as a free-standing jail operation similar to the Sheriff's Office.

Since Raymore, Pleasant Hill and Harrisonville do not operate jails and only temporarily hold individuals until they are transported to jail, the communications centers in these agencies have limited exposure to jail-type responsibilities. They do provide some degree of video monitoring of holding areas and support for female prisoners if no female officers are on duty. If a full physical consolidation were pursued, these agencies would need to adapt their processes to handle the monitoring of holding areas with officers or other personnel.

Sex Offender's Registration – This function is performed by the Jail at the Sheriff's Office, so the individual communications centers are not impacted by this responsibility.

Warrant Entry – The Sheriff's Office communications center handles all warrant entry and management for felony warrants in MULES, and the individual cities handle municipal warrants in Regional Justice Information Service (REJIS). Therefore, all the communications centers have a close working relationship with their jails and/or arresting officers when it comes to handling warrant materials and entries. Some of the REJIS work is accomplished by non-communications staff during normal working hours on weekdays, but the communications centers are still closely involved since they provide the only 24-hour presence for this function for the agency. If a full physical consolidation were pursued, finding mechanisms to deal with the management and storage of physical warrants will be a key consideration.

Monitoring Cameras/Alarms – All the communications centers have some degree of security alarm, security camera or jail camera monitoring responsibilities. Since this is largely a passive responsibility (rather than requiring active eyes-on monitoring at all times) various techniques of camera triggers or camera roaming cycles are used to provide wide-area situational awareness in the communications center. If a full physical consolidation were pursued, all of these camera and alarm feeds would need to be transported to the new facility and integrated into a video and alarm monitoring system to make them more manageable in the larger multi-jurisdictional setting.

Administrative Phone Calls – The individual agencies with their own communications centers already utilize various techniques to minimize the number of administrative phone calls that need to be handled by their communications centers. This includes the use of direct dial lines for various functions so the public can directly reach the function they need, phone-tree systems to allow callers to a general number to pick a choice from a list to reach the intended

function, and voice mail systems. The communications center takes calls that can't be handled by these mechanisms and/or for lines that require answering by a live person on a 24-hour basis. If a full physical consolidation were pursued, this function could be integrated into the operations of the new organization.

Dispatching of Public Works and Parks Departments – The municipal communications centers provide after-hours call answering and call out for various city departments that provide after-hours responses such as public works. The Sheriff's Office is not responsible for after-hours lines for any other county agency. If a full physical consolidation were pursued, this function could be integrated into the operations of the new organization.

Utility Phone Calls and Dispatching – The Harrisonville communications center takes a more active role than the other agencies to answering of utility-related phone calls and processes. The communications personnel may take utility payments after hours, and can also call in an officer for that duty. In addition, Harrisonville communications personnel take an active role in assisting the electrical company in mitigating situations caused by severe weather. Raymore does monitor the radios assigned to their utility workers, and does provide the radio training. If a full physical consolidation were pursued, the telephone aspects of this work could be integrated into the operations of the new organization, but additional training would be needed given the unique aspects of the utility business. After-hours receipt of utility payments would need to be accommodated through the officer call-in process.

Monitoring Local Government Radio Traffic – Day-to-day radio traffic on general government channels is not routinely monitored at the communications centers, but they all have access to these channels on their radio consoles if they need to interact with them during severe weather or similar situations. If a full physical consolidation were pursued, this function could be integrated into the operations of the new organization.

Emergency Management Phone Calls and Dispatching – As the 24-hour emergency communications location for their jurisdiction, the communications centers have the ability to contact their emergency management organizations either directly or through chain-of-command procedures. If a full physical consolidation were pursued, this function could be integrated into the operations of the new organization.

Running Criminal History – All the communications centers currently run criminal history and similar queries for their field officers and other authorized personnel. If a full physical consolidation were pursued, this function could be integrated into the operations of the new organization.

In addition to the above specific non-dispatch tasks, the following non-dispatch tasks were identified at various agencies.

- Harrisonville – The communications center monitors the city's technology and network monitoring system and can alert city technology staff of any malfunctions or alarm conditions. This could be done remotely if a full physical consolidation were pursued.
- Belton – Officers bring in updated business contact information and the communications personnel input that information into the CAD. This could be done remotely if a full physical consolidation were pursued.
- Raymore – Communications personnel have a close working relationship with the senior community at Foxwood Springs and dispatch there frequently. They also have a relationship with HUD to update housing and protection order databases. These functions could be done remotely if a full physical consolidation were pursued.

- Pleasant Hill – This community is the site for the annual County Fair, and communications center activities ramp up significantly during the fair. This support could be done remotely if a full physical consolidation were pursued.

TELEPHONE CALL VOLUMES AND CALL PROCESSING STATISTICS

One of the most important roles for the public safety communications center is the quick, efficient and accurate answering and processing of incoming calls for service from the public. Prior to wireless telephone services coming into existence, the Enhanced 9-1-1 systems provided highly accurate location information for each 9-1-1 call since physical addresses were associated with each phone line. This allowed the call receivers and dispatchers to focus their attention on determining the nature of the call and identifying the appropriate resources to send rather than having protracted conversations with callers regarding their actual location.

This has all changed with the explosion of wireless telephony and the growth in the numbers of calls to 9-1-1 coming from wireless phones. Currently the communications centers in Cass County receive between 75% and 85% of their total 9-1-1 calls from wireless devices. While location accuracy for wireless calls is improving, it will be many years (if ever) before it becomes as accurate as the legacy wireline environment. Further, single individual events such as large auto accidents or fires now generate a flood of calls from multiple wireless users.

The net result is that communications center personnel now must spend considerable amounts of time on each call determining and verifying the actual location of an emergency before resources can be dispatched. Further, since the location information from wireless phones is imperfect and the coverage footprints of the individual cell towers typically can overlap multiple jurisdictions, it is increasingly difficult to assure that the wireless call to 9-1-1 is initially routed to the 'proper' communications center. The combination of answer-and-transfer times and the often-extended caller interrogation process makes it very challenging for communications centers to process calls within industry standards and best practices.

The two most often recognized call answering and call processing standards are promulgated by the National Emergency Number Association (NENA) and the National Fire Protection Association (NFPA). The key performance indicators from each of these standards are outlined below.

National Emergency Number Association (NENA) Call Answering Standard/Model Recommendation – NENA Document 56-005 issued June 10, 2006

Section 3, Call Taking Standards

3.1 Standard for answering 9-1-1 Calls. 90% of all 9-1-1 calls arriving at the Public Safety Answering Point (PSAP) shall be answered within 10 seconds during the busy hour (the hour each day with the greatest call volume), as defined in the NENA Master Glossary 00-01). 95% of all 9-1-1 calls should be answered within 20 seconds.

3.2 Order of Answering Priority. It is the responsibility of the on duty telecommunicators to answer all incoming calls. All phone calls will be answered in order of priority. 1st priority will be the 9-1-1 and emergency 7/10 digit phone lines; 2nd priority will be non-emergency lines; and 3rd priority will be the administrative and/or internal phone lines.

3.7 Transferring emergency calls. When emergency calls need to be transferred to another PSAP, the telecommunicator will transfer the call without delay. The telecommunicator will advise the caller: "Please do not hang up; I am connecting you with (name of the agency)". The telecommunicator should stay on the line until the connection is complete and all pertinent information has been relayed to the answering PSAP.

Many communications center organizations establish the NENA call answering standard as their core performance indicator for evaluating their responsiveness to the 9-1-1 calls being made by the public. While this is certainly an important metric, it only accounts for how quickly the call is answered but not how quickly the call can be processed and ready for dispatch. As discussed above, with a combination of location accuracy challenges and answer-and-transfer challenges for wireless 9-1-1 calls, the public's perception of how quickly the call is answered can be adversely impacted by any complication in the call routing or location information.

National Fire Protection Association (NFPA) Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems – NFPA Standard 1221, 2016 Edition

Chapter 7 – Operations, Section 7.4 Operating Procedures

7.4.1* 95% of alarms received on emergency lines shall be answered within 15 seconds, and 99% of alarms shall be answered within 40 seconds. (*Sec. 12.5.2 – Statistical analysis for call and dispatch performance measurement shall be done monthly and compiled over a 1-year period.)

7.4.2* With the exception of the calls identified in 7.4.2.2 below, 90% of emergency alarm processing shall be completed within 64 seconds, and 95% of alarm processing shall be completed within 106 seconds. (*Sec. 12.5.2 – Statistical analysis for call and dispatch performance measurement shall be done monthly and compiled over a 1-year period.)

7.4.2.2 Emergency alarm processing for the following call types shall be completed within 90 seconds 90% of the time and within 120 seconds 99% of the time:

1. Calls requiring emergency medical dispatch questioning and pre-arrival medical instructions.
2. Calls requiring language translation
3. Calls requiring the use of a TTY/TDD device or audio/video relay services
4. Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units
5. Hazardous material incidents
6. Technical rescue
7. Calls that require determining the location of the alarm due to insufficient information
8. Calls received by text

7.4.4* Where alarms are transferred from the primary PSAP to a secondary answering point, the transfer procedure shall not exceed 30 seconds for 95 percent of all alarms processed. (*Sec. 12.5.2 – Statistical analysis for call and dispatch performance measurement shall be done monthly and compiled over a 1-year period.)

7.4.4.1 The PSAP shall transfer alarms as follows:

1. The alarm shall be transferred directly to the telecommunicator.

2. *The answering transferring agency shall remain on the line until it is certain that the transfer is effected.*
3. *The transfer procedure shall be used on emergency 9-1-1 calls.*

The NFPA standards are often preferred by communications centers that are handling emergency medical services calls since the standard focuses on the time needed to process the call and have it ready for dispatch of response units. Since response time is one of the key metrics in determining patient outcomes, minimizing the time needed to get the call answered, get the location verified, get the caller to the proper call receiving location, and get the call processed in CAD and queued up for dispatching is extremely important. It is important to remember that in terms of the patient, all time increments in their mind start when they press the second “1” when dialing 9-1-1 and any delays in routing, transferring or similar processes are ticks on their clocks relative to the timeframes identified in the standard.

When analyzing telephone call volumes for communications centers, the data and workload need to be evaluated from a number of different perspectives. First, we examine call volumes on a day-of-the-week basis to determine if there are any unusually high volumes on particular days that might require special consideration in a staffing model. The graph below (Figure 3) shows the call distribution pattern for all the communications centers in Cass County. This is a very typical pattern seen across the country and doesn't indicate any unique need to staff particular days of the week any differently other than the potential for a slight reduction in call receiver staffing on Sundays.

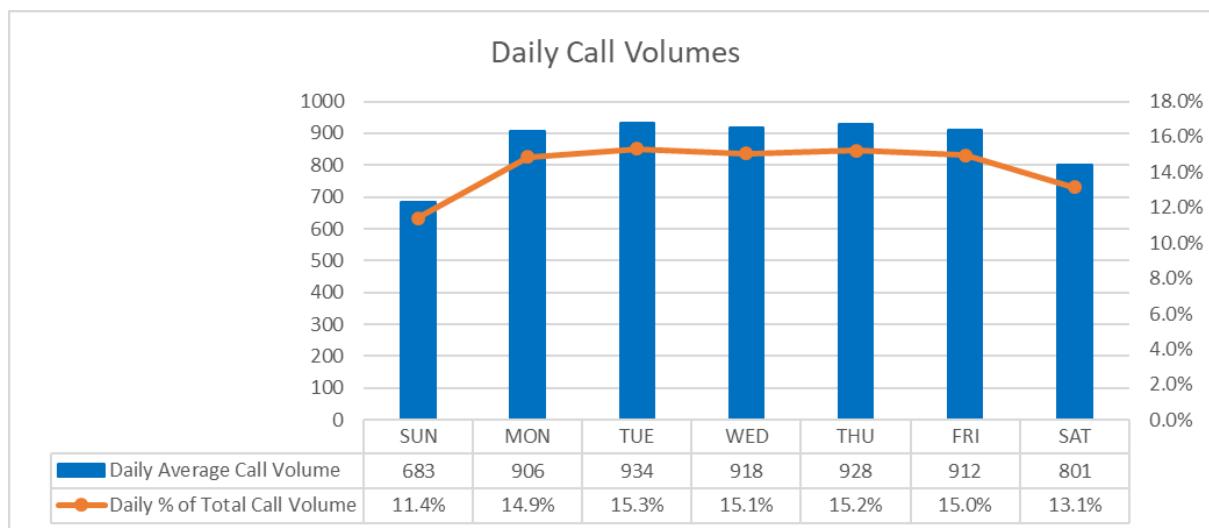


Figure 3 - Call Volumes and % of Total Call Volumes by Day of Week

Call volumes are also examined on a month-by-month basis to determine if there are significant seasonal patterns (this is often seen in areas with any seasonal recreational activities). The graphs below (Figures 4 & 5) show fairly typical monthly distributions of 9-1-1 and administrative call volumes across a typical 12-month period. All agencies appear to flow through this cycle at the same relative call volume levels and minor increases during summer months is typical in most jurisdictions. While this degree of seasonal variation creates challenges meeting staffing levels in the busy summer months when communications staff want to also take vacation time, this is very typical across the industry and would not require artificially increasing overall staffing levels to handle the 2-3 busiest months.

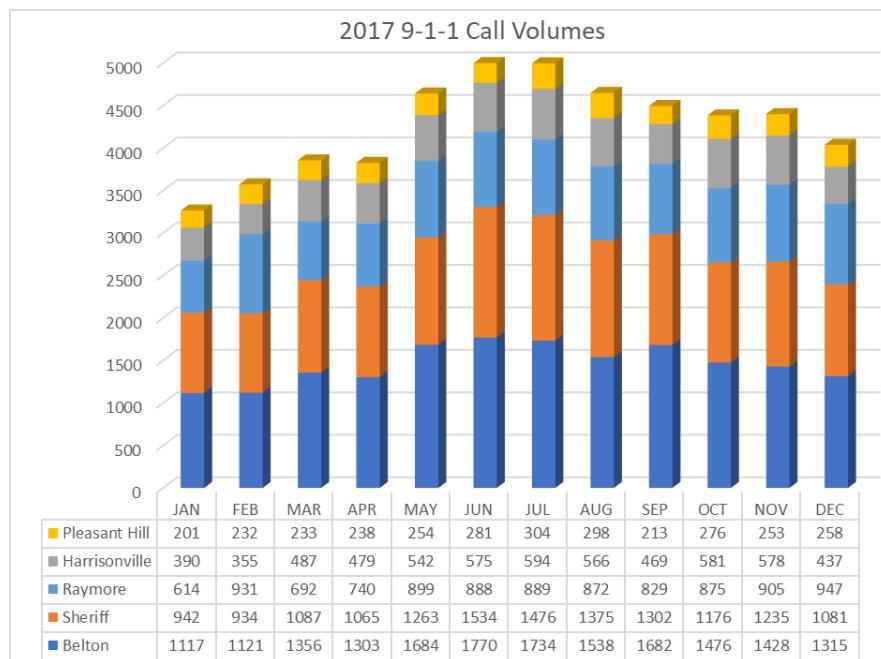


Figure 4 - 9-1-1 Call Volumes by Month of Year

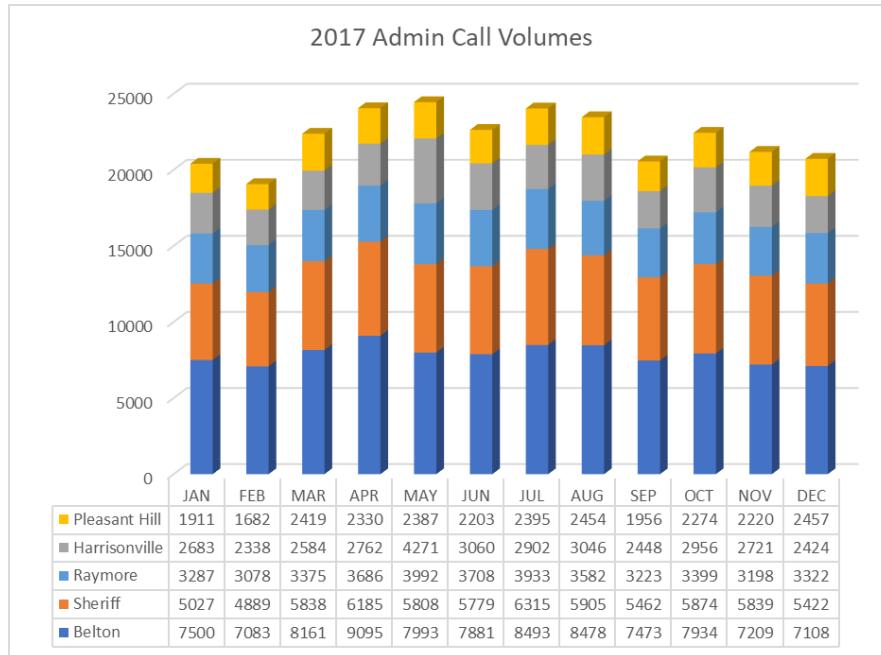


Figure 5 - Administrative Call Volumes by Month of Year

Based on the 2017 data:

- Belton handles approximately 33% of the total call volume
- The Sheriff's Office handles approximately 26% of the total call volume
- Raymore handles approximately 16% of the total call volume
- Harrisonville handles approximately 14% of the total call volume
- Pleasant Hill handles approximately 11% of the total call volume

The last generalized perspective needed to consider potential staffing strategies is how the total call volumes flowing through the centers varies across the normal 24-hour day. Table 5 below shows the comparison of hour call volumes across all five communications centers. This table is prepared as a 'heat map' so the fluctuation from the busiest hours of the day (red) and the slower (yellow) and even slower (green) hours of the day can be compared across the centers.

	Belton		Sheriff's Office			Raymore		Harrisonville			Pleasant Hill			
0000	257	2.7%	8	198	2.7%	6	111	2.5%	3	106	2.6%	3	83	2.7%
0100	207	2.2%	6	179	2.4%	5	96	2.1%	3	91	2.3%	3	83	2.7%
0200	189	2.0%	6	165	2.3%	5	85	1.9%	3	94	2.3%	3	78	2.5%
0300	156	1.7%	5	145	2.0%	4	72	1.6%	2	77	1.9%	2	58	1.9%
0400	150	1.6%	5	145	2.0%	4	75	1.7%	2	73	1.8%	2	55	1.8%
0500	156	1.7%	5	158	2.2%	5	80	1.8%	2	84	2.1%	3	61	2.0%
0600	195	2.1%	6	177	2.4%	5	113	2.5%	3	85	2.1%	3	74	2.4%
0700	287	3.1%	9	225	3.1%	7	164	3.7%	5	136	3.4%	4	101	3.2%
0800	388	4.1%	12	322	4.4%	10	205	4.6%	6	164	4.1%	5	166	5.3%
0900	467	5.0%	14	387	5.3%	12	238	5.3%	7	192	4.8%	6	208	6.7%
1000	500	5.3%	15	413	5.6%	13	255	5.7%	8	225	5.6%	7	204	6.6%
1100	517	5.5%	16	418	5.7%	13	246	5.5%	8	219	5.5%	7	187	6.0%
1200	536	5.7%	16	398	5.4%	12	257	5.7%	8	223	5.6%	7	193	6.2%
1300	546	5.8%	17	440	6.0%	13	262	5.8%	8	243	6.1%	7	194	6.2%
1400	573	6.1%	18	434	5.9%	13	281	6.3%	9	247	6.2%	8	214	6.9%
1500	570	6.1%	17	443	6.1%	14	281	6.3%	9	250	6.2%	8	208	6.7%
1600	540	5.8%	17	417	5.7%	13	290	6.5%	9	233	5.8%	7	171	5.5%
1700	617	6.6%	19	400	5.5%	12	266	5.9%	8	248	6.2%	8	144	4.6%
1800	563	6.0%	17	356	4.9%	11	249	5.6%	8	217	5.4%	7	129	4.1%
1900	491	5.2%	15	359	4.9%	11	220	4.9%	7	201	5.0%	6	111	3.6%
2000	439	4.7%	13	348	4.8%	11	195	4.3%	6	179	4.5%	5	104	3.3%
2100	394	4.2%	12	315	4.3%	10	172	3.8%	5	169	4.2%	5	100	3.2%
2200	361	3.8%	11	274	3.7%	8	148	3.3%	5	139	3.5%	4	100	3.2%
2300	283	3.0%	9	203	2.8%	6	125	2.8%	4	110	2.7%	3	83	2.7%

Table 5 - 2017 Hourly Call Volumes

The graph in Figure 6 (following page) shows how overall call volumes vary throughout the day for each of the individual communications centers and for the combined total call volumes of all communications centers combined. Again, this is a very typical pattern seen around the country and would not create any unique challenges to creating a staffing model for a full physical consolidation.

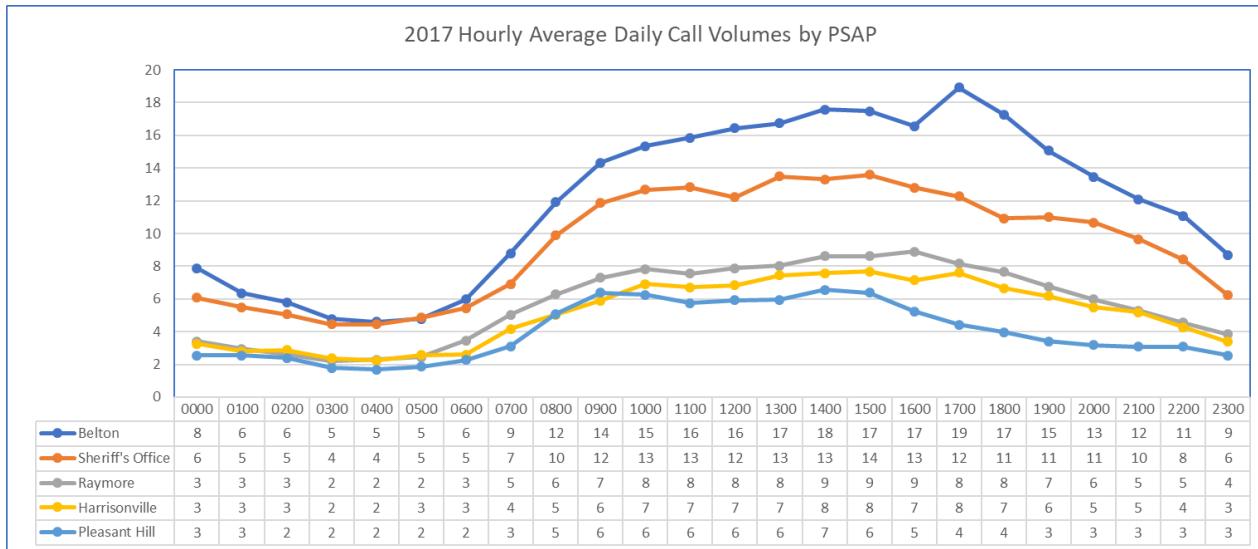


Figure 6 - Total Call Volumes by Hour of Day for each Communications Center

Finally, the graph below in Figure 7 shows the overall call volumes if all the existing communications centers were consolidated into a single operation. During the busiest hours of the day, the average hourly call volumes will run between 45 and 55 calls per hour, with the 11 busiest hours from 0900 to 1900 accounting for approximately 65% of the total call volume for the day.

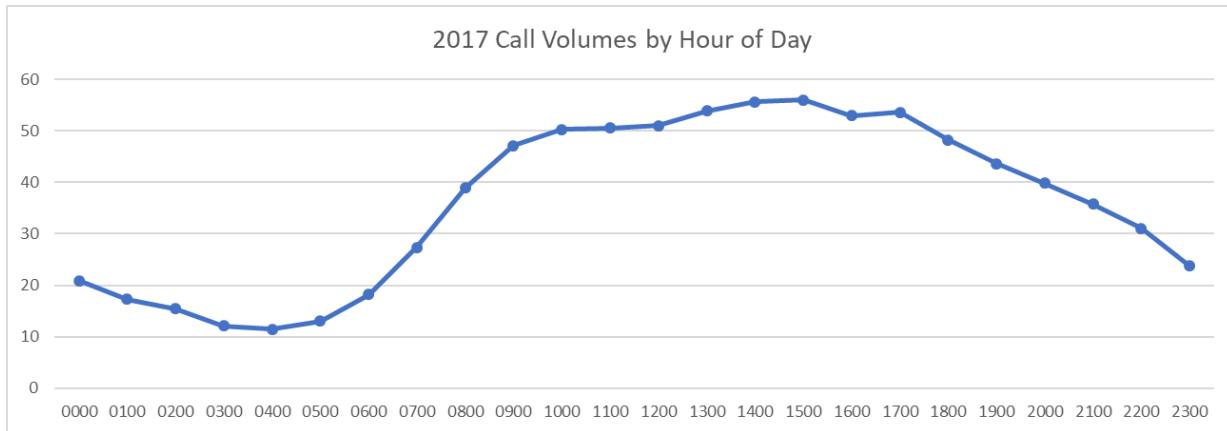


Figure 7 - Combined Call Volumes by Hour of Day

PROJECTED CALL VOLUMES AND WORKLOAD FOR A FULLY CONSOLIDATED OPERATION

Since consideration of a full physical consolidation requires consideration of a new facility, it is important to understand the long-term potential growth in overall workload that the center would need to accommodate. One of the best ways to anticipate future call volumes is to consider the current call volume per population and then extrapolate future call volumes based on population estimates. Based on the 2017 data, the total call volume of 316,909 calls were generated by a total county population of 103,374² people. This is a net average of 3.1 calls per population.

The Missouri Office of Administration, Division of Budget & Planning produces future population projections by county and publishes the projections for the top-ten largest counties³. This data indicates that between 2000 and 2030 Cass County is projected to grow by approximately 67%. Utilizing this growth rate against the 2017 experiences, it is projected that Cass County's population could expand to approximately 201,076 by 2050, a reasonable life expectancy for any newly constructed facility for a full physical consolidation. The graph below (Figure 8) shows this population projection.

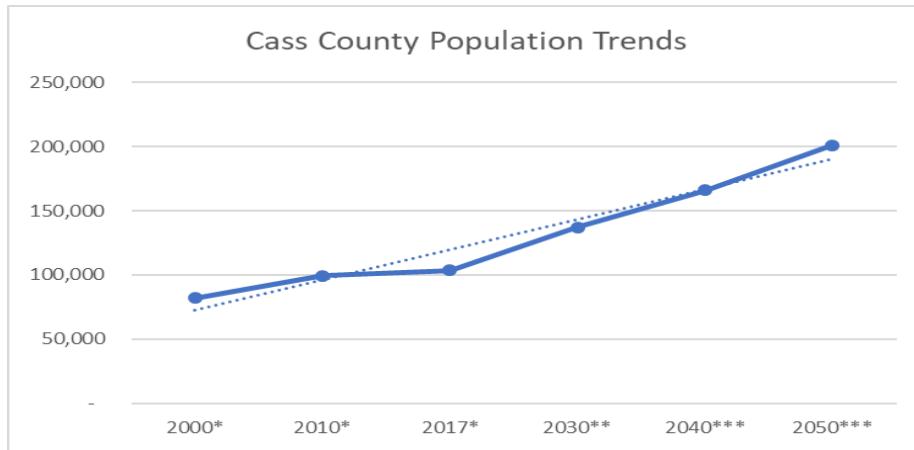


Figure 8 - Population Projection Through 2050

* US Census Data

** 2030 projection from the State Office of Administration, Division of Budget & Planning

*** 2040 and 2050 projected at same growth rate as 2000 to 2030 projection

At these projected population growth levels and the current 3.1 calls per population, the future annual, daily and hourly call volumes could reach the levels shown in the Table 6 on the following page.

² Population data from US Census Bureau July 2017 estimate

³ Projections available at the following web site: <https://archive.oa.mo.gov/bp/projections/fig2-5.pdf>

		2030	2040	2050
Projected Annual Call Volume		418,373	506,979	614,350
Projected Average Daily Call Volume		1,146	1,389	1,683.15
0000	2.4%	28	33	40
0100	2.0%	23	28	33
0200	1.8%	20	25	30
0300	1.4%	16	19	23
0400	1.3%	15	18	22
0500	1.5%	17	21	25
0600	2.1%	24	29	35
0700	3.1%	36	44	53
0800	4.5%	51	62	75
0900	5.4%	62	75	91
1000	5.8%	66	81	98
1100	5.8%	67	81	98
1200	5.9%	67	82	99
1300	6.2%	71	86	104
1400	6.4%	74	89	108
1500	6.5%	74	90	109
1600	6.1%	70	85	103
1700	6.2%	71	86	104
1800	5.6%	64	77	94
1900	5.0%	58	70	85
2000	4.6%	53	64	77
2100	4.1%	47	57	69
2200	3.6%	41	50	60
2300	2.7%	31	38	46

Table 6 - Projected Annual, Daily and Hourly Call Volumes

IXP has developed a workload modeling tool that utilizes industry standard Erlang calculation techniques to evaluate staffing levels compared to call volumes and predict the experience of the calling party under various call volume, call receiver staffing, and call duration scenarios. This tool allows a dynamic assessment of the impact staffing levels can have on call answering times and the quality of the experience for the public calling 9-1-1.

From a total call volume perspective, the call volumes by 2050 could potentially require staffing of at least 4 dedicated call receiver positions for the majority of the average day, and a 5th position during the busiest hours of the day. This recommendation is based on three key call answering performance metrics: the Average Wait Time; the Percent of Calls That Wait; and the expected Wait Time for Calls that Wait.

In Figure 9 below, we see that as call volumes approach 90 calls per hour, the average wait time for all calls will exceed the NENA target of 10 seconds with only 4 call receivers. Adding the 5th call receiver allows even the busiest expected hour to be handled within the 10 second average threshold.

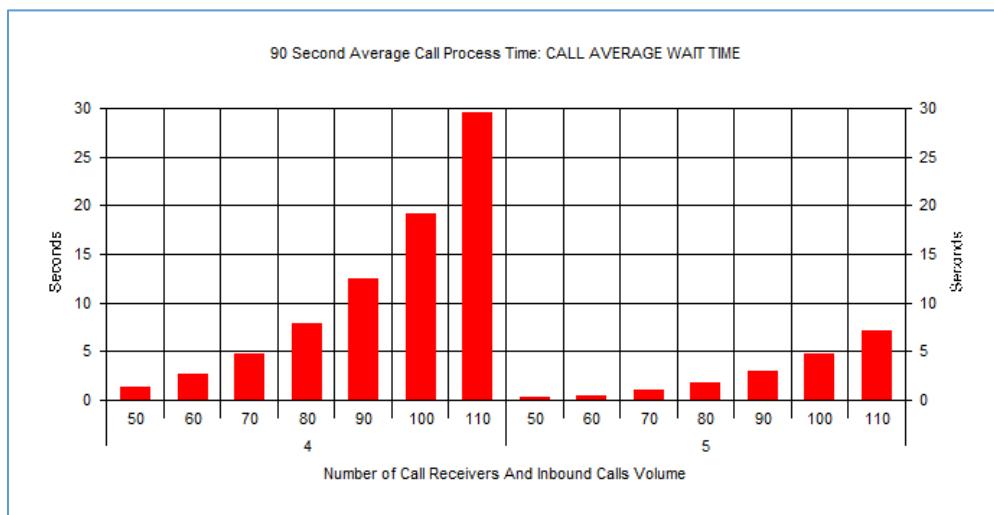


Figure 9 - Average Call Wait Times at 50-110 Calls Per Hour and 4 or 5 Call Receivers

In Figure 10 below, we see that as call volumes approach 70 calls per hour, the percentage of calls that wait climbs above 10% and around the 90 calls per hour threshold where the average wait time crossed above 10 seconds (Figure 8) the percentage of calls experiencing that 10 second wait climbs to approximately 20%.

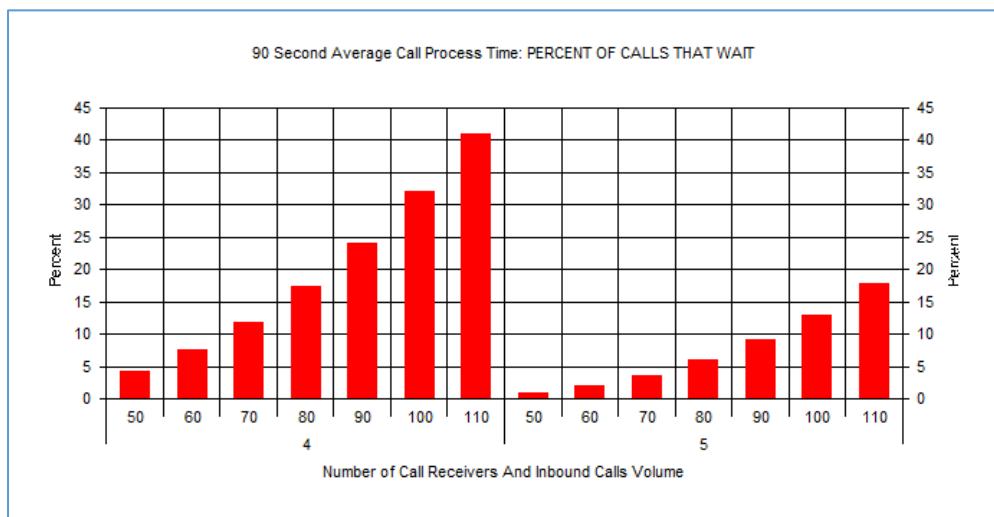


Figure 10 - Percentages of Calls that Wait at 50-110 Calls Per Hour and 4 or 5 Call Receivers

In Figure 11 below, we see that with only 4 call receivers at the threshold levels described above, the wait times for calls that actually experience an extended wait time may climb to over 40 seconds. This is unrealistic in an emergency call receiving scenario as most callers will abandon their call if they have not been answered in 20-30 seconds (or even less in stressful situations).

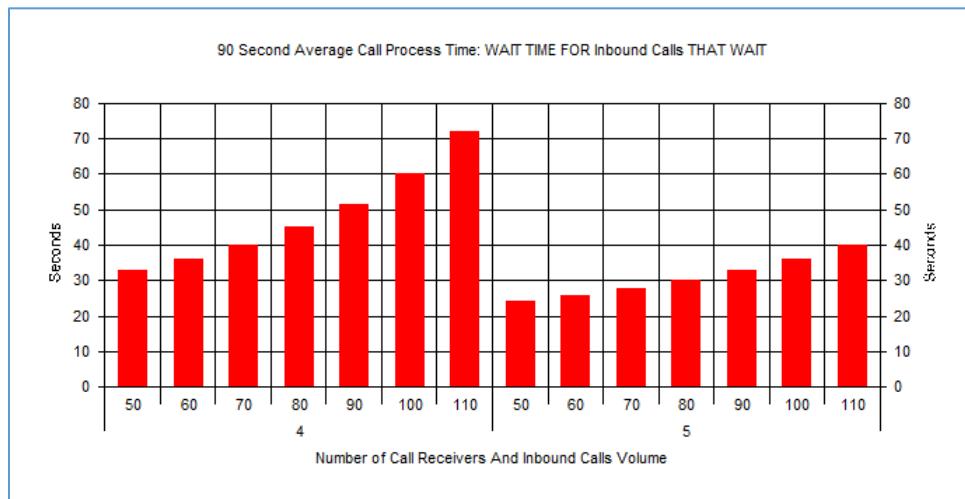


Figure 11 - Wait Times for Calls That Wait and 50-110 Calls Per Hour and 4 or 5 Call Receivers

With these call answering requirements in mind, we also need to consider the estimated staffing levels for dispatching and other related functions in the communications center.

Unlike the call receiving environment where the estimated staffing levels needed to handle various call volumes can be predicted based on well understood statistical methods, establishing the required levels for dispatch positions is much more subjective. Attempts are sometimes made to perform detailed time-on-task calculations for dispatch positions but these often produce spurious conclusions other than in large organizations where each radio position handles a prescribed number of units and interactions with field units are highly routine across all positions. This is not the setting in a multi-jurisdictional and multi-disciplinary communications center serving a broad range of large and small law enforcement agencies and a combination of career and volunteer fire agencies.

Insights on relative dispatcher workload and capacity can be drawn from radio channel utilization data captured from the radio system. Radio system data from March 2018 was used to gain an understanding of the relative traffic levels on the most used talkgroups. As shown in Table 7 below, of the 25 busiest talkgroups the primary talkgroups utilized for law enforcement and county jail communications account for approximately 80% of the total utilization on the radio system. Belton PD is the busiest channel with 23% of the total traffic and the three primary channels used by the Sheriff's Office (Dispatch 1, Dispatch 2 and Jail) also account for 23% of the traffic. Raymore PD is the second busiest individual channel at 16% of the traffic and Harrisonville PD and Pleasant Hill PD follow at 11% and 5% respectively.

Sample Radio Traffic Data for Month of March 2018					
TG Name	Description	PTTs	Daily Average Radio PTTs	% of Total	Aggregate %
BPD DISP	Belton PD Dispatch	71029	2291	23%	23%
RMPD DSP	Raymore PD Dispatch	50220	1620	16%	40%
CASSDSP1	Sheriff Office Dispatch	34595	1116	11%	51%
HPD DISP	Harrisonville PD Dispatch	33685	1087	11%	62%
CASSJAIL	Cass County Jail	22361	721	7%	69%
PHPDDSP1	Pleasant Hill PD Dispatch	15843	511	5%	74%
CASSDSP2	Sheriff's Office - Small Cities	14188	458	5%	79%
BFD DISP	Belton Fire Dispatch	13187	425	4%	83%
SMETROFD	South Metro Fire Dispatch	10295	332	3%	87%
HES DSP	Harrisonville Emergency Services (Fire)	8202	265	3%	89%
LSFD DSP	Lee's Summit Fire Dispatch	7589	245	2%	92%
C CASS FD	Central Cass Fire Dispatch	4072	131	1%	93%
CASSMSHP	Missouri State Highway Police (in Cass Co)	2722	88	1%	94%
RD BRDG1	Cass County Road & Bridge	2691	87	1%	95%
GDCTY FD	Garden City Fire Dispatch	1970	64	1%	95%
CASS PSDISP	PSAP-to-PSAP	1793	58	1%	96%
DREX FD	Drexel Fire Dispatch	1612	52	1%	97%
PECLR LG	Peculiar Local Government	1535	50	1%	97%
DWD FD	Dolan West Dolan Fire Dispatch	1292	42	0%	98%
BPD TAC1	Belton PD TAC	713	23	0%	98%
ELYNN FD	East Lynne Fire Dispatch	709	23	0%	98%
HPD ACO	Harrisonville PD Animal Control	685	22	0%	98%
FMA SE 1	Fire Working Channel	629	20	0%	98%
FMA NW 2	Fire Working Channel	555	18	0%	99%
PHL FD	Pleasant Hill Fire Dispatch	534	17	0%	99%

Table 7 - Sample Radio Traffic Data on the 25 Busiest Talkgroups

In the law enforcement setting, it is recommended that each dispatch position support one or more agencies on a single primary working radio channel (talkgroup) with a secondary channel available for car-to-car and non-priority communications with the dispatcher. If two or more agencies are being worked by a single position on multiple channels, there are increased opportunities for two or more units to be talking to dispatch at the same time and having one or all of them missed by the dispatcher. By being on a single channel all officers hear one another and adapt to a radio cadence that allows all of them to get their communications made with the dispatcher without any of them being missed by the dispatcher or covered by other radio traffic.

Based on current operational practices and the proportionality of radio traffic discussed above, IXP estimates that the ideal initial staffing configuration for a full physical consolidation (one going live in approximately 2021 if a decision to pursue this approach were made in 2018) would be as follows:

- 4 Dispatch Positions for Law Enforcement Dispatching (sample configuration)
 - 1 position for the Sheriff's Office (Dispatch & Jail)
 - 1 position for Belton PD
 - 1 position for a combination of Raymore and one or two smaller agencies
 - 1 position for the Pleasant Hill and the balance of the smaller agencies
- 2 Fire/EMS dispatch positions
- 1 to 3 Call Receiver positions depending on time of day

The number of personnel needed to fill these positions will depend on the shift scheduling pattern ultimately selected for the consolidated operation and the aggregate leave time benefits that are granted to the workforce. Across the communications center industry it is not uncommon to see coverage factors of 5.8 to 6 FTE for each position to be covered on a 24-hour basis. IXP recommends using a factor of 6 FTE per position when doing high-level preliminary estimates such as being done in this study. Then, as planning proceeds and detailed decisions are made on shift scheduling, leave time benefits, mandatory training hours, and similar detractors that take personnel away from their working positions, more refined ratios can be established.

With the 7 routinely staffed positions described above to be staffed 24-hours per day at the 6:1 ratio, a total of 42 personnel will be needed. Staffing the 2 additional call receiver positions for the busiest hours of the day would require an additional 6 FTEs bringing the total to 48 FTEs. Included in this count would be 6 Supervisors characterized as 'working supervisors' responsible for both supervising the shift and working a position as needed to meet workload demands (such as at the 2nd fire position or the slowest police position). The balance of the shift workforce would be characterized as Telecommunicators and be cross-trained to fulfill both call receiving and dispatching duties, for law enforcement and fire/EMS positions, depending on their working assignment at any given time.

In addition to these operational shift personnel, the organization will need a small complement of 'day shift' administrative personnel to round out the operation. A Director position will be needed to provide overall operational and administrative guidance for the organization and to work with the governance bodies established for the new organization. To assist this person, and to support the shift supervisors, an administrative supervisor position could be established with a mixed portfolio of responsibilities including acting in place of the Director when needed, running the training and quality assurance program for the organization, and supplementing the shift supervisors when needed. Finally, it would be preferable to have a technology and facilities coordinator position in the model to serve as the overall coordinator for all the technology systems, the relationships between the communications center systems and the user agency systems, and to coordinate maintenance activities provided by the various vendors and service suppliers.

For agencies this size, IXP does not typically see the organization establish their own accounting, HR/Benefits/Payroll and similar administrative positions. Rather, one of the participating agencies typically serves as the administrative 'host' for these functions and performs these functions for a fee paid by the consolidated dispatch organization and then included in their overall cost basis allocated across their community of user agencies.

In summary, the total estimated annual salary and benefit costs for a full physical consolidation would be estimated at \$3,480,000 as shown in Table 8 on the following page. The salary levels utilized in this estimate are slightly higher than the current average mid-points for these positions in the current organizations. The actual compensation levels needed at the time the organization is formed may be slightly higher or lower than this depending on conditions at the time. Compensation level estimates for the administrative positions are estimated based on fairly normal differentials between the shift personnel and administrative positions of this nature.

Position Description	# of Slots	Coverage Ratio	Total FTE Count	Estimated Salary	Estimated Total Salaries	Estimated Benefit Costs (45%)	Total Compensation Costs
Shift Operations Positions							
Supervisors	1	6	6	\$ 55,000	\$ 330,000	\$ 148,500	\$ 478,500
Telecommunicators - Baseline	6	6	36	\$ 45,000	\$ 1,620,000	\$ 729,000	\$ 2,349,000
Telecommunicators - Busy Hours	2	3	6	\$ 45,000	\$ 270,000	\$ 121,500	\$ 391,500
Total Shift Personnel			48				\$ 3,219,000
Administrative Positions							
Director	1	1	1	\$ 70,000	\$ 70,000	\$ 31,500	\$ 101,500
Administrative Supervisor	1	1	1	\$ 55,000	\$ 55,000	\$ 24,750	\$ 79,750
Technology/Facilities Coordinator	1	1	1	\$ 55,000	\$ 55,000	\$ 24,750	\$ 79,750
Total Administrative Personnel			3				\$ 261,000
Total Organizational Staffing			51				\$ 3,480,000

Table 8 - Projected Salary and Benefit Costs at Start-up

SECTION 3 – TECHNOLOGY CONSIDERATIONS

The public safety agencies and communications centers in Cass County are already deriving a number of economic and operational benefits from utilization of shared technology systems. By implementing a countywide subsystem on the regional trunked radio systems, all communication center and system user are linked together with wide area coverage and capacity to grow into the future. Acquiring 9-1-1 services and systems through participation in the Mid-America Regional Council (MARC) provides economical service and regional technology planning and coordination. Shared systems are also in place for ancillary technologies such as logging/recording on the regional trunked radio system, the fire station alerting system and the shared Everbridge community notification system. The communications center also all utilize similar CAD systems from the same vendor.

With these shared systems and strategies already in place, there are only two additional steps that would be needed to accomplish a virtual consolidation of the communications center. The term virtual consolidation is typically characterized as the ability to answer, process and dispatch an incident from two or more communications centers fully interconnected by shared technology system. The practical reality of virtualized operations is that most of the virtualization of work is focused on the call receiving and incident entry side of the workflow while dispatching tends to remain at the individual communications centers associated with the agency or agencies being dispatched. This allows incoming calls to be entered at whichever communications center first receives the call, a key benefit in wireless calls that make up a large percentage of the total call volume but occasionally don't get routed to the 'correct' PSAP in the initial call delivery.

While many systems are already 'shared', further work is needed to virtualize their operational capabilities to achieve a virtual consolidation of operational capabilities. The two most significant changes will be in the 9-1-1 technology systems and in the CAD systems. The architecture of the 9-1-1 telephone systems (and their supporting networks) will need to be modified to allow calls to flow dynamically between communications centers based on call receiver availability to answer the call quickly. Second, the CAD systems will either need to be interconnected, or replaced by a single shared CAD system, to allow any communications center to enter and/or dispatch a call.

IXP interviewed representatives from MARC to gain a better understanding of the current architecture and capabilities of the existing 9-1-1 networking and systems. During this process it was clarified that while all the Cass County communications centers are utilizing system equipment from a common vendor and with common operational capabilities, they are not hosted on a single core system to allow dynamic routing of 9-1-1 calls among the centers. The communications centers in Cass County are actually hosted on three separate system cores in the overall MARC 9-1-1 network:

- The Sheriff's Office, Belton and Pleasant Hill operate on the "South Patrol" host
- Raymore operates on the "Johnson County" host
- Harrisonville operates on the "Kansas City" host

Dividing the PSAPs between separate hosts accomplishes several desirable benefits including balancing the loads across these regional host nodes and increasing the resilience of having 2 or more PSAPs in Cass County remain operational if one of the serving hosts were to fail. But this strategy makes it more difficult to move traffic dynamically among individual PSAPs within Cass County not on the same host. So, for example, dynamic call routing would be easier to achieve among the Sheriff's Office, Belton and Pleasant Hill since they operate off the same host, but moving traffic between any of these three to Raymore or Harrisonville (or between these two PSAPs) requires routing between hosts.

To achieve a full virtualization within the Cass County communications centers, work will need to be done with MARC and their vendor to determine if the necessary changes can be made to the core hosts and networks. Moving all the communications centers to a single host should be avoided to preserve the redundancy and resiliency already in place, but reconfiguring Raymore or Harrisonville to operate on a common host could be one step in the process.

Moving to a virtualized 9-1-1 call routing capability will require more than technology changes. Current MARC policy does not allow automatic call overflow and alternate routing among PSAPs, even if they are on the same hosts. If Cass County wanted to pursue this strategy, considerable work will need to be done with MARC and their vendor to carefully define the parameters for any automatic inter-PSAP call overflow and routing so that MARC's governing process can fully understand any potential issues and make informed policy decisions that meet Cass County's goals while also not adversely impacting other PSAPs being served by MARC's systems.

Even if 9-1-1 virtualization can't be achieved, or can only be achieved among PSAPs on a common host but not between PSAPs on different hosts, significant benefit could be achieved by virtualizing the CAD environment. With all the Cass County communications centers operating on interconnected CAD systems, or on a newly implemented common CAD system, regardless of where a call was initially routed the call could be processed and entered into CAD to avoid a call transfer. This would speed up the CAD entry process both for wireless calls that didn't happen to arrive at the correct PSAP in their initial call routing and for calls that got to the proper primary PSAP for law enforcement purposes but needed to be transferred to a secondary PSAP for fire or EMS dispatching.

While all the communications centers in Cass County use the same CAD vendor, the systems in place for each of them are not identical. The Sheriff's office, Belton and Pleasant operate systems from servers present at their communications centers while Raymore and Harrisonville operate on Omnilgo's hosted server solution. IXP has attempted to engage in dialog with Omnilgo to explore the potential for CAD-to-CAD interfaces between these systems but Omnilgo has been slow in providing feedback and further information. They have advised that it may be difficult for them to design the appropriate interfaces between these system, but this has not yet been confirmed and cost estimates have not yet been generated.

The alternative is to implement a single new instance of the Omnilgo CAD environment and use that as a shared platform for all the communications centers. This would likely be a preferable course of action since multiple CAD-to-CAD interfaces could be costly to implement and complicated to sustain. Conversely, once a new regional version of the CAD system is created and built from all the existing geographical, place name and related information in the individual CAD systems today, this single uniform CAD capability would be available at all the communications centers concurrently. This shared common CAD system would then be interfaced to the individual RMS systems at each of the agencies just as it is today with their stand-alone systems.

Operating all the communications centers on a common CAD platform will bring a number of other benefits to Cass County. Besides the concept of virtualizing the ability to enter 9-1-1 calls for service wherever they arrive, all the PSAPs will be able to back each other up during major emergencies or system failures at individual PSAPs. This would not be possible if CAD-to-CAD interfaces were used since the actual dispatch capability would lie in each individual CAD system and only the call entry process would be virtualized.

Omnilgo did not respond to requests for cost estimates for a regionalized CAD strategy.

SECTION 4 – FACILITY OPTIONS

IXP conducted visits to each of the existing communications centers to develop an understanding of their current size, condition, long-term usability and potential for expansion.

Belton – Belton’s communications center is located in the core of the Belton Police Department facility and is co-located and integrated with the jail. The center is equipped with three dispatch console furniture positions and has no space for adding further positions. The location and configuration of the center also precludes physical expansion to increase the capacity. The technology equipment space is also at capacity. The center is fully supported by backup power systems and is likely highly survivable given its location in the facility and the structural characteristics of the combined jail/communications center area of the building. The facility can likely serve the needs of the city for many years to come, but is not a candidate for expansion to become a centralized communications center for Cass County at large.

Raymore – Raymore’s communications center is located on the first floor of a two-story municipal building and protected from the exterior of the building by a layer of office spaces. The operational floor of the center is approximately 600 square feet and also has a technology equipment room, two associated offices and a file storage area. The center is fully supported by backup power systems. The center is configured with three dispatch console furniture positions and could be expanded to four positions with reconfiguration. The current capacity should allow the city to meet its needs for many years to come, but it is not a candidate for expansion to become a centralized communications center for Cass County at large.

Pleasant Hill – Pleasant Hill’s communications center is located on the first floor of a two-story brick building that has had various uses over the years. The communications center is located on an exterior corner of the building and has exterior windows on two sides. The center itself is quite small and filled with two dispatch console furniture positions. Technology equipment spaces are cramped and not capable of accommodating much more equipment. The facility is supported by backup power systems. While the facility meets current needs, it will be challenging to support future technology migration cycles as they continue in the future, or to meet any need for growth. The facility is not a candidate for use in a centralized communications strategy.

Harrisonville – Harrisonville’s communications center is located in a recently constructed facility for the Harrisonville PD. The center itself is placed in a fully contained reinforced concrete structure within the overall facility and designed to withstand severe weather events. The center is currently configured with two dispatch console furniture positions and with different furniture and configuration could accommodate up to four positions. The center is fully supported by backup power systems. The technology equipment room is well configured and could accommodate additional systems if needed. The center will be able to meet growth needs for the city for many years to come, but with space for only four dispatch console positions it would not be a candidate for a centralized communications center serving the county at large (and given the robust nature of its construction, physical expansion would be challenging and displace other Harrisonville PD functions).

Sheriff's Office – The Sheriff's Office communications center is located on the 2nd floor of the Sheriff's Office facility. The communications room itself is approximately 1,200 square feet and is currently configured with four dispatch console furniture positions. The center also integrates two offices, a technology equipment

room, kitchen/break area and a restroom. The center is well protected in the interior of the building, with windows on a wall facing into a secure courtyard rather than the exterior of the building. The facility is fully supported by backup power systems. Using existing furniture configurations, the center could accommodate two additional dispatch furniture positions and with different furniture and configuration may be able to fit up to eight positions. This will allow the facility to meet the needs of the Sheriff's Office and the agencies they support for many years to come. While the space is large enough to make it a useful location to serve as the backup facility if a new fully centralized facility were constructed, it is not large enough to support the full needs of a fully centralized communications center organization as outlined below.

With none of the existing facilities having the potential to be expanded and modified to become a fully centralized communications center for the entire county, it will be necessary to consider a new facility if a full physical consolidation is pursued. IXP has worked with a number of jurisdictions of similar size to plan free-standing consolidated communications facilities to meet their needs over reasonable facility planning horizons of 20-30 years. Based on this experience, IXP would recommend considering a facility of approximately 6,700 square feet, as outlined below and in Table 9 that follows. A brief description of each of the spaces is provided below.

- Secure Entry Vestibule – Even though the facility would likely not have much if any public accessibility, personnel from the agencies being served will frequently have a need to come to the facility and interact with the Director or staff. Typically, there will not be staff available to personally allow them entry to the building so having a secure entry vestibule with outer and inner doors allows communications center personnel to observe the person requesting entry over a video feed and remotely allow the person access to the outer door of the vestibule. Then, when that door is closed, the inner door can be remotely unlocked to allow the person access to the building.
- Front Counter and Administrative Support Area – While the facility may not initially require an administrative support staff, this may become a need in the future. Planning space for this function, as well as for the administrative support systems such as copy/print machines, file cabinets, and office supply storage needs to be factored in from the start.
- Director's Office – The Director of the organization will need a private office to conduct business and have confidential conversations when needed.
- Administrative Supervisor Office – In the initial staffing model, IXP recommends having a 'day-shift' Supervisor position that augments both the director and the shift supervisors, while also administering the agency's training and quality assurance program. This person will need a private office to conduct business and have confidential conversations when needed.
- Technology/Facilities Coordinator – Since much of this positions work will also take place in the technology equipment room or the technology project work space, a cubicle should be sufficient for this role.
- Shift Supervisors/Counseling Office – The shift supervisors will need a small office/work-room to perform private work such as employee evaluations and to perform employee counseling when needed. This office area would be located immediately off the communications room and adjacent to the working dispatch position designed for the shift supervisor's function.
- Meeting/Training Room – The facility will need a moderately sized meeting room for use mostly as a training room and for small working meetings of the center staff and meetings with customer agency groups.

- Communications Room – The communications room needs to be sized to accommodate a supervisor's position and up to 12 call receiver/dispatcher positions. For centers this size, IXP recommends that all positions be equipped to perform all functions to allow maximum flexibility in staffing and positioning as the agency grows over time.
- Kitchen/Break Area – A small kitchen and break area is need for the 24-hour operation of the center.
- Restrooms – Restrooms need to be easily accessible from the communications room.
- Locker Space – A small area, likely integrated with an employee entrance area to the communications room, is needed for small lockers for each employee in the 24-hour staffing model.
- Quiet Room – It is important to have a small room where personnel can be given breaks to de-pressurize from particularly challenging incidents.
- Technology Equipment Room – The facility needs a competently sized technology equipment room to support future growth and to allow for replacement systems to be installed and tested before legacy systems are removed.
- Technology/Special Projects Work Space – Communications centers undergo frequent cyclical replacement of workstations and other communications room equipment. Working space is needed to stage and configure these devices and perform other special projects over the life of the facility.
- Storage Room & Janitor Closet – Space is needed to store janitorial and general supplies for the facility and to store survival supplies for the 24-hour operation.
- Mechanical and Electrical Rooms – Dedicated spaces for mechanical and electrical systems and equipment that support the full facility.

Prospective Space Plan for Centralized Communications Center			
Description	# Units	Unit S.F.	Total S.F.
Secure Entry Vestibule	1	64	64
Front Counter/Administrative Support Area	1	250	250
Director's Office	1	150	150
Administrative Supervisor Office	1	120	120
Technology/Facilities Coordinator cubicle	1	81	81
Shared Shift Supervisors/Counseling Office	1	150	150
Multi-function Meeting/Training Room	1	250	250
Communications Room - Supervisor Position	1	165	165
Communications Room - Dispatch Positions	12	150	1,800
Kitchen/Break Area	1	250	250
Restrooms	2	150	300
Locker Space	1	150	150
Quiet Room	1	81	81
Technology Equipment Room	1	400	400
Technology/Special Projects Work Space	1	150	150
Storage & Janitor Closet	1	150	150
Mechanical Room	1	150	150
Electrical Room	1	200	200
			-
Net Working Areas			4,861
Working Area Circulation (25%)			1,215
Total Gross Working Areas			6,076
General Building Gross-up (10%)			608
			6,684

Table 9 - Prospective Space Plan for Centralized Communications Center

Free-standing and contemporary public safety communications centers are typically the most expensive facilities projects ever undertaken by local governments. Designing in all the required electrical, mechanical and technological capabilities of the system, and coupling that with high survivability in areas prone to severe weather or similar natural disaster potentials create cost-per-square-foot exposures that are seldom seen in governmental facility projects.

IXP has seen projects of this nature range anywhere from \$400/sf to well over \$600/sf, and we have seen facilities in seismic-risk areas run up to over \$900/sf. A variety of factors influence the ultimate cost of the facility including the cost of the land acquired for the facility (sometimes these facilities can be placed on land already owned by a local government) the magnitude of the civil engineering and construction needed to bring utilities to the facility (including things like diverse routed telecommunications and power services and a microwave tower) and the degree of survivability built into the structure. If the \$600/sf range were experienced, a facility as outlined would cost in the neighborhood of \$4 million.

If a full physical consolidation is pursued, it will also be important to identify a facility to use as a backup. Even with the most robust survivability characteristics, things can go wrong at a communications center that render it inoperable, so having an equipped and ready backup is extremely important. Because of its size and flexibility, the Sheriff's Office facility makes the most sense as the facility to reconfigure to maintain as the backup to a newly-constructed centralized communications center.

SECTION 5 – SUMMARY AND CLOSING

IXP believes that considerable regional benefit could be achieved through increasing levels of virtual consolidation with the communications centers already in operation. Even if full virtualization becomes impossible in the 9-1-1 environment, migration to a shared common CAD system will allow operational procedures to be modified to allow incidents to be entered wherever they are received. This will significantly reduce the call processing time, as viewed from the perspective of the citizen calling for help, by avoiding transfers to other communications centers for either primary or secondary call handling.

While this approach doesn't provide a physical centralization of fire and EMS dispatching, it will reduce call processing times and get the incidents dispatched faster, thus improving the level of service to the communities being served. If the fire agencies currently being dispatched by Lee's Summit were to structure relationships with Cass County communications centers instead, the net effect would be a centralization of fire/EMS dispatching in Cass County through the virtual consolidation of the existing communications centers.

Even though Omnigo has not provided any costs estimates for this undertaking, IXP believes it will be found to be an economical mechanism to significantly improve the efficiency of call processing across the county. This approach will also allow the existing communications centers to remain in operation as currently configured if this is desired by the individual agencies.

From IXP's experience, decisions to proceed with any level of operational, technological or physical consolidation take considerable time to evaluate and decide-upon. We believe the information in this report will provide a framework to guide these deliberations into the future so that all participating agencies can make informed decisions on the preferred path forward.